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CHANGES IN THE SOFT PART COLORATION OF THE INDIAN REEF HERON, *EGRETTA GULARIS* (BOSC) RELATED TO AGE AND BREEDING STATUS¹

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Age dependent changes in the soft part coloration of the Indian Reef Heron, *Egretta gularis* (Bosc) from the day of hatching to adulthood are described. The nuptial colour changes in the soft parts are correlated with the nesting status.

INTRODUCTION

Coloration of the soft parts of the Indian Reef Heron, *Egretta gularis* (Bosc) changes with the age and breeding status, so that the coloration when viewed with other evidences gives a clue to the bird's age and breeding status; a knowledge of the soft part colour changes has been useful in some of our field studies on the heron. Moreover, in certain areas where the reef heron is sympatric with the Little Egret, *Egretta garzetta*, they tend to interbreed, and since a striking difference

between the two species is coloration of their soft parts, we feel that a detailed description of the soft part colours at different stages of life in both the species should prove useful in further studies on the inter-relationship between the two herons.

Plumage colour variations and sequence of plumage changes in the reef heron are described earlier (Naik and Parasharya 1983). However, a brief review is necessary here. In the white as well as grey phases the natal down is white in most of the feather tracts, but it is subjected to some colour variation ranging from light grey to grey in the dorsal tract. The pin juvenile feathers start appearing, pushing out the natal down at the age of 6-8 days. The juvenile white plumage ranges from an almost pure white to one heavily dappled with grey. The juvenile grey is grey

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dorsally and light grey or white ventrally. The full adult plumage is attained at the age of 20-21 months. The adult white plumage is pure white and the adult grey is grey all over except the chin and throat which are white. Both the juvenile and adult grey plumages may, or may not, have wing patch of variable size on one or both the wings.

Before the breeding season a drooping nuchal crest of two narrow plumes develops in both the sexes and phases. In addition to the crest, filamentous ornamental feathers develop on the scapular region and long, narrow, lanceolate plumes on the lower parts of neck and upper breast. Nuptial feathers are shed just after the nesting is over, but in some cases it happens in April when the birds are still feeding their young, so that in the beginning of the breeding season (February) 90% of the birds may be with nuchal crest but during the second peak of breeding (July-August) only 40% may have it.

MATERIALS AND METHODS

The present report is based on our field notes made during the studies on the distribution (Naik and Parasharya *in press*), breeding biology (Parasharya and Naik *in press*; Naik and Parasharya *in prep.*) and ecology of the reef heron (unpublished) and also on our observations of some captive birds maintained in our University aviary for studying the sequence of plumage changes and polymorphism (Naik and Parasharya 1983).

OBSERVATIONS

Colours of the soft parts described below are applicable to both the grey and white phases of the Reef Heron, unless mentioned otherwise. There were always a small number of *E. garzetta* and/or *garzetta-gularis* hybrids

inter-breeding with *E. gularis* in the breeding colonies, so that some of the variations in the coloration of soft parts may possibly be attributed to the hybridization. The age dependent changes in the plumage and coloration of soft parts are summarized in Table 1.

DOWNY NESTLINGS

Skin. The freshly hatched chicks have pink-yellow (flesh coloured) skin all over. The skin appears greyish green at the age of 3 days when the feather follicles deep within the skin start generating the juvenile plumage.

Eye. Iris colour of the freshly hatched chick is brown, and it remains so until the natal down is pushed out by the juvenile feathers.

Beak. The beak of freshly hatched chick is pinkish yellow with some brown at the tip of both the mandibles and base of the upper mandible. By the time the juvenile feathers start appearing as pin, the brown on the upper mandible has increased in density to be prominent. Though the brown on the lower mandible also tends to spread a little, the lower mandible continues to remain almost yellow throughout the downy plumage stage.

Legs. At the age of about 3 days, a slight green tinge appears on the tibia and upper tarsus and the feet start turning light yellow. Gradually the tibia and tarsus become light greyish green and the feet become light yellow, tinged with green.

Lore. Lore (facial skin) which is pink-yellow at the time of hatching gradually turns dark brown to grey.

CHICKS IN JUVENILE PLUMAGE AND SUBADULTS

Skin. The skin which appears greyish green during the initial stage of the juvenile plumage growth, starts turning yellow after the age of 10 days, and it is conspicuously yellow

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TABLE 1
A SUMMARY OF AGE-DEPENDENT CHANGES IN THE TYPE OF PLUMAGE AND COLORATION OF SOFT PARTS IN THE INDIAN REEF HERON

	0-day	1 Week	2 Weeks	1 month	6 months	20 months
Plumage type	natal down	juvenile in pin	juvenile	juvenile	juvenile	adult
Body skin	pinkish yellow	greyish green	yellow	yellowish grey	grey	grey
Eye	brown	brown	light brown	cream	yellow	yellow
Beak ¹	pinkish yellow	um-brown lm-yellow	yellow (base & tip brown)	yellow (base & tip brown)	yellow (base & tip brown)	yellow (usually)
Lore	pinkish yellow	dark brown to grey	brown	brown	yellow with traces of green	yellow (usually)
Tibia & tarsus	pinkish yellow	greyish green	yellowish green	greyish green	black with traces of green	black
Feet	pinkish yellow	light yellow	light yellow	light yellow	light yellowish with green tinge	yellow

¹ um = upper mandible, lm = lower mandible.

by about the 16th day. Later, the skin starts turning grey but the yellow tinge may continue to persist for a long period. However, all the birds acquire uniformly grey skin before reaching the age of 6 months.

Eye. Slight white tinge appears in the brown iris at the age of 11 days, and the brown progressively becomes lighter. The iris turns cream coloured by the age of 4 weeks and yellow by the age of 6 months.

Beak. The upper mandible is largely dark brown or grey and the lower one yellow when the juvenile feathers start appearing. By the age of 20 days, threefourths of the upper mandible becomes yellow, the brown being restricted to the base and tip. An overall appearance of the beak is yellow at the age of 4 weeks but the brown at the base and tip continues to persist and does not disappear completely even at the age of 6 months.

Legs and feet. When the pins of juvenile feathers appear, the tibia and tarsus are greyish green and the feet light yellow. The tibia and tarsus gradually turn yellowish green, but at the age of 15 days, a tinge of grey appears on the front face of the tarsus. At the end of 4 weeks, the tibia and tarsus are greyish green, and the frontal surface of the tarsus is marked with black bands. At the end of 6 months a slight dull green colour still persists on both the tibia and tarsus of some birds, though they have turned completely black in the others. The feet remain light yellowish green at least up to the age of 6 months, but thereafter they gradually turn light yellow.

Lore. The lore remains dark till 4 weeks of age. Thereafter, light greenish yellow colour appears among brown and gradually the yellow tinge increases to make the facial skin yellow with only a little tinge of green by the end of 6 months.

ADULT

Eye. The iris of the adult bird is yellow.

Beak. The beak colour of the adult bird is variable. Variations in the beak colour are categorized into two basic types, yellow and black, which occur in the grey as well as white morphs in the non-breeding as well as breeding seasons. It may be mentioned here that the birds feeding in certain types of habitat often get their beak smeared with mud which on drying obscures the true beak colour (Naik *et al.* unpublished).

Yellow: This may range from pure yellow to pinkish. (a) Pure yellow: Both the mandibles are pure yellow. This is the most frequent beak type. (b) Pinkish yellow: Though the basic colour of both the mandibles is yellow, there is a pinkish tinge all over. Though infrequent, the pinkish yellow beak was recorded during the non-breeding season also.

Black: Both the mandibles are completely black without any yellow tinge.

Lore. The lore of the adult birds is yellow. Occasionally we came across birds that had small patches of blue on the yellow lore and also those with bluish green or blue lore.

Legs. In non-breeding adults, the tibia and tarsus are black and the feet are bright yellow. The bright yellow of feet often extends up to the distal end of tarsus.

NUPTIAL COLOUR CHANGES

The beak, lore and iris are usually yellow, but they acquire the nuptial colours during the courtship (pre-pairing and pair formation) stage of the nesting cycle. In both the grey and white phases, the beak usually remains yellow, but in some it may acquire a red tinge. If the bird happens to have a black beak, no recognisable change in the beak colour occurs.

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The iris which is normally pale yellow turns to bright yellow and may even acquire a red rim in some birds. The lore turns to bright pink red or crimson. The feet and lower tarsus which are normally yellow turn to pink-red. The upper tarsus and thigh region which is dull grey normally do not change colour, but in some birds even these parts also acquire a red tinge. Pink-red in the feet and lore of the individuals perching alone (unpaired) is brighter than that of paired birds or nest-building birds. The pink colour tends to fade during the nest-building phase, and it almost completely fades out when the first egg is laid. The toes turn to pale orange-yellow and ultimately resume their original colour. The lore first turns to pale pink, then to bluish white and thereafter to pale yellow and ultimately to its original yellow colour. If a pair loses its clutch during the incubation period and if it is to re-build the nest, the nuptial colours return to the soft parts once again. The birds breeding in juvenile plumage also acquire nuptial colour when they start nesting.

We recorded the beak colour of 181 white-phase reef herons in different stages of their nesting cycle in breeding colony and the record is summarized in Table 2. These data illustrate some of the points we have made hereinbefore for both the phases, namely the yellow is the most frequent beak colour for the birds in every stage of the nesting cycle, the yellow beak may turn pinkish in some (but not in all) birds during the nesting season and a small proportion of birds have their beak black in colour which remains apparently unchanged through the nesting season.

DISCUSSION

The age-dependent changes in the coloration of soft parts of Indian Reef Heron, des-

cribed in this paper and summarized in Table 1 for the convenience of the readers, should be useful in ageing the chicks and distinguishing the older from younger juveniles in the field.

TABLE 2

FREQUENCY OF DIFFERENT BEAK COLOURS OF THE WHITE-PHASE REEF HERONS IN RELATION TO THEIR NESTING STATUS, AS RECORDED IN THE NEW PORT COLONY, BHAVNAGAR

Nesting stage	Number of birds with designated beak colour			
	pinkish yellow	yellow	black	all combined
Unpaired	1	34	4	39
Courtship	2	20	4	26
Nest-building	2	22	4	28
With eggs	4	43	5	52
With chicks	1	31	4	36
All stages combined	10	150	21	181

In the present state of our knowledge it is not possible to say as to how much variation in the soft part coloration described here is attributed to hybridization between the Little Egret and reef heron that has been occurring since long in our area (Naik and Parasharya 1985) However, it is certain that the appearance of blue lore and black beak (which are characteristic features of the Little Egret) in our population of the reef heron is a result of gene flow from the Little Egret populations.

Nuptial colour changes in soft parts during early stages of the nesting cycle are now known to be widespread in the family Ardeidae (Blaker 1969). Ali and Ripley (1968) have mentioned colour changes asso-

ciated with breeding in many Indian Ardeidae, but not for the Indian Reef Heron. In certain populations of the reef heron in Africa, the beak turns from yellow to black as a part of nuptial colour changes (Hancock and Kushlan 1984). In our population of the reef heron, however, only noticeable change in the beak colour is for the yellow to turn pink-yellow in some birds. A few birds that we observed having pink-yellow beak in the non-breeding season were probably exceptional; an increased blood flow in the subcutaneous network of blood capillaries, either because of some emotional stress or premature hormonal changes, may have turned the beak pinkish.

Recently, Hancock and Kushlan (1984) have merged the reef heron with the Little Egret. These authors consider the Little Egret, *Egretta garzetta* (Linnaeus) as a polytypic species consisting of six subspecies, namely *garzetta* — an all white race with a range in the temperate, subtropical and tropical zones of the Old World, *nigriceps* — also an all-white race occurring on the islands of south-eastern Asia and the southwest Pacific, *immaculata* — also an all-white race of northern

and eastern Australia, *gularis* — a polymorphic race on the west African coast from Mauritania to Gabon, *schistacea* — another polymorphic race distributed along the coastline extending from the west coast of Indian subcontinent to Persian Gulf and the Red Sea, and south along the African coast up to Tanzania, and *dimorpha* — also a polymorphic race found on Madagascar and other islands in and around Mozambique Channel. While available information on the soft part coloration of the above mentioned assemblage of herons are illustrated by Hancock and Kushlan (1984), detailed information of the changes in soft part coloration dependent on age and nesting status in these birds are urgently needed to understand their evolution.

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